Water Quality Status Report No. 118

Ground Water Study of the Lower Boise River Valley Ada and Canyon Counties, Idaho

Idaho Department of
Health and Welfare
Division of Environmental Quality
May 1996

Appendix F

Standard Operating Procedures
DEQ Drinking Water Monitoring Requirements
EPA Health Advisory on Dacthal

STATEWIDE PROGRAM FIELD SAMPLING CRITERIA

Event	Criteria/Comments	SOP
GENERAL	* Do not substitute sampling sites. * Ensure that ALL field inspection information is complete. * Note septic tank or other contaminant source locations. * Check summary sheet for required special samples.	2.00 1.00
WELL PURGING	* Monitor pH, temperature, and SC. * Record readings every 5 minutes until readings stabilize over 3 successive measurements within: 0.2 Celsius, 5% μS/cm, 0.1 pH unit. * Record last purging readings as site field parameters.	3.00
DECON	Before field: * Detergent wash all equipment. * Sterilize bacteria filter assembly. Before filtration: * Triple rinse all equipment in native water. * Use gloves or non-metal tweezers to place filter. * Run 200 ml native water through filter. After filtration: * Remove filter; run 500 ml deionized water through apparatus. * Triple rinse all equipment with deionized water.	4.00
SAMPLES	* Refer to Sample Schedule for bottle types, treatment and shipping.	5.00
UNFILTERED	* Collect directly from source.	5.00, p.1
FILTERED	* Collect from churn splitter or flow through filtration system.	5.00, p.2
PRESERVING	* Use gloves, safety goggles. Have spray wash handy. * Use preservation chamber. * Break ampules away from the body. * Discard used ampules in bottle of deionized water.	
VOC	* Collect directly from the source. * Slide sample water and preservative down inside wall of vial. * Keep trip/transfer blanks with samples at all times. * Note any odors, spills, haze, etc. * Do a **rigorous** bubble check when collected. Ignore bubbles that form later. * Do not skip sample for aerated waters. (See SOP)	5.00 p.3,4
RADON	* Collect last. * Rinse syringe with native water. * Avoid aerating the sample. Withdraw slowly. * Inject 10 ml native water under mineral cocktail. * Recap and shake sample vigorously.	5.00, p.5

Event	Criteria/Comments	SOP
SAMPLES, cont. SPECIAL PESTICIDES	* Check Summary Sheet * Two bottles for NAWQA sites (Schedules 2001 and 2050). Use NAWQA charge code. * One bottle for all others listed on summary sheet (schedule 2001). * For both types, also request LC8008 (filtration). Mark bottle and forms: **'Sample Must be Filtered'.**	11.0
FIELD PARAMETERS	* Alkalinity (end point) * pH, temperature (water & air), specific conductance * Water level if possible	4.50
BACTERIA	* Media less than 72 hours old. * Sterilize filter unit according to SOP. * Use sterile buffer water before and after each volume. * Pre-blank, 30 ml and 100 ml sample. Shake sample first. * Incubate at 44.5°C for 24(±2)hours. Count all colonies with blue coloring within 20 minutes of removal. * Autoclave all cultures before discarding.	5.50
SHIPPING	**Refer to Sample Schedule of SOP for destinations and details** OVERNIGHT: Radon OVERNIGHT(that day/next morning): Nutrients, Pesticides OVERNIGHT(every two days, M & W): VOCs MAIL(every two days, M & W): Immunoassays ONCE per WEEK: Common ions, trace elements ONCE per TWO WEEKS: RadChem	6.00
FIELD FORMS	* Mail every week * **Notify Ivalou within two days of sites with FC Bacteria detections.**	7.00
LABELS/LAB FORMS	* Use NAWQA account number for NAWQA pesticide sites. * Enter **both** Site ID **and** local well numbers on lab forms and bottles. * Protect bottle labels and lab forms from moisture or condensation. * Note field team and date shipped on VOC lab forms.	8.00
QC SAMPLES	EQUIPMENT BLANKS: One per crew; first week in season. BLIND PREFERENCE: Two per month per crew. REPLICATES: RU, FU, FA, FCC Four per crew per season. Radchem Four per crew per season. VOCs As specified on summary sheet. VOC TRIP BLANKS: One per shipment. VOC TRANSFER BLANKS: One per shipment. VOC FIELD SPIKES: As specified for NAWQA. * Refer to SOP for QC Sample labeling.	9.00

Sample Bottle and Shipping Summary

Sample	Request	Bottle Type	Pre-Rinse	Treatment	Storage	Bottles Marked	Shipping	Ship To
Volatile Organic Compounds (VOCs)	Method 524.2	Three 40 ml amber glass vials	No	Raw + 2 drops HCl; Avoid aeration; No bubbles in final sample	Chill	VOC	Critical - Fed Ex all samples every Mon & Wed.	Alpha Analytical 255 Glendale Ave, #21 Sparks, NV 89431
Immunoassays	No form necessary	One 60 ml amber glass	Yes	Raw	Chill	Pesticide	Critical - Mail all samples every Mon & Wed.	Janet Crockett IDWR 1301 N. Orchard St. Boise, ID 83706
Pesticides *(For specified sites only).*	Sch 2001 Sch 2050 (NAWQA sites only)	One 1 liter amber glass baked NAWQA sites: Two 1 liter amber glass baked	No	Raw See SOP # 11.0	Chill	GCC	Critical - Fed Ex Overnight, same day/next a.m. Ship Friday samples Friday.	Denver USGS Lab
Radon	LC1369	One 20 ml clear glass	No	10 ml water injected beneath mineral oil cocktail. Shake well.	Cardboard Tube	LC1369, Military Time	Critical - Fed Ex overnight.	Denver USGS Lab Attn: Ann Mullin
Radchem	Gross Alpha and Gross Beta	One 1 liter plastic cubic container	No	Raw + 2 ml nitric acid (HNO_3)	No chill	Radchem	Once per two weeks.	Janet Crockett IDWR 1301 N. Orchard St. Boise, ID 83706
Common Ions	Sch. 42	One 250 ml plastic One 250 ml plastic One 250 ml acid rinsed plastic	Yes Yes Yes	Raw, untreated Filter 0.45 µm, untreated Filter 0.45 µm, + 1 ml nitric acid (HNO_3).	No chill No chill No chill	RU FU FA	Once a week.	Denver USGS Lab
Nutrients	Sch. 400	One 125 ml amber plastic	Yes	Filter 0.45 µm (no preservative)	Chill	FCC	Critical - Fed Ex overnight, same day/next a.m.	Denver USGS Lab
Trace Elements	Sch. 1066	One 250 ml acid rinsed plastic	Yes	Filter 0.45 µm, + 1 ml nitric acid (HNO_3).	No chill	FA	Once a week	Denver USGS Lab
Fecal Coliform Bacteria	do on-site	Autoclaved 500 ml polypropolene	No	See SOP # 5.50	Chill until filtered	-	Filter and incubate on-site	Immediately notify Ivalou O'Dell of any detections.

Field parameters to be done on site:

Water Level (if not done at time of inventory)
Fecal Coliform (see above and SOP # 5.50
pH
Temperature, water and air
Alkalinity - end point
Specific Conductance @ 25°C

June 20, 1995

STANDARD OPERATING PROCEDURE FOR FIELD INVENTORIES

Applicability: This SOP was prepared for and applies to activities related to the Statewide Ground Water Quality Monitoring Program and may not be specifically applicable to activities of other organizations.

Purpose: A thoroughly completed field site inventory considerably shortens the process of sampling a site during the summer season. In addition, as representatives of both the state and federal government, we are responsible to these well owners to make sure we're getting permission from the right source, and that we are able to contact them if we find a problem with their water.

Criteria:

1) Do not substitute monitoring sites (SOP #2).

2) Ensure that Field Inventory forms are filled out completely. Write the complete mailing address, including the town and zip code. Make sure the spelling of the owner's name is correct. Try to get a phone number where someone can be reached during the day. If that's not possible, note a time when someone can be reached and the phone number.

3) If a site is a rental, be sure to get the owner's permission and address. Include names and addresses for both the renter and the owner.

4) In addition to noting potential contamination sources, be sure to fill out the requested information on septic tanks. This information is critical for data analysis, particularly in interpreting anomalous nitrate results.

5) For stock and irrigation wells, find out how long the well will be used for the season. Sampling will take place from June 12, through September 30.

6) For other government agencies (BLM, USBR, USFS) call them first. It will probably save you time.

7) If possible and you have permission, measure the water level either at the time of inventory or prior to sampling.

STANDARD OPERATING PROCEDURE FOR PURGING A WELL

Applicability: This SOP was prepared for and applies to activities related to the Statewide Ground Water Quality Monitoring Program and may not be specifically applicable to activities of other organizations.

Purpose: Ground water samples for the Statewide Ground Water Quality Monitoring Program are collected from existing public supply and private wells that are equipped with a pump, or that flow naturally under artesian pressure. Purging is necessary to obtain a representative sample of the formation water from these wells.

Procedures:

1) On the QW field sheet, not the time well purging began and the time sampling began; or note the total duration of the well purging. To estimate duration, see notes below.

2) Calibrate field parameter equipment measuring instruments, e.g., pH and specific conductance meters following manufacturer's instructions.

3) Attach hose or portable discharge apparatus to sampling hydrant and place other end at the bottom of the churn splitter or stainless steel or plastic bucket, or connect to a flow through chamber. Turn water on.

4) Estimate discharge, if possible, and record on QW field sheet.

5) During purging, monitor temperature, pH, and specific conductance of the water being discharged into the churn splitter or stainless steel bucket. Make sure that open containers continue to fill from the bottom and that flow through changers do not develop back pressure.

6) Record readings every 5 minutes (or more) until readings stabilize over three successive measurements, as follows:

temperature	within 0.2 degrees Celsius
specific conductance	5% (or within 5 μS/cm when < 100 μS/cm)
pH	0.1 unit

If readings do not stabilize within the removal of **four** casing volumes worth of water, proceed with sampling, but make clear notes to that effect on the QW field sheet.

7) When all field parameters have stabilized, record final values on field sheet and proceed with sample collection.

8) Decontamination equipment used in the purging process (SOP # 4.00).

Estimating Time for Well Purging

To estimate the duration of purging a well to remove 3 casing volumes of water, the formula is:

$3K(\pi r^2 h)/d$, where:

K = 7.48 gallons per ft^3, conversion factor
π = 3.142
r^2 = casing radius (in feet) squared
h = well depth (in feet), (or total well depth minus water level depth)
d = estimated pump discharge rate (gallons per minute)

For example, a well has a casing diameter of 10 inches, the well depth is 150 feet and the discharge is estimated to be 45 gallons per minute. A 10 inch diameter has a 5 inch radius which is equal to 0.417 feet.

$3K(\pi r^2 h)/d = 70.5 * (r^2 h)/d$

$(70.5 * (.417)^2 * 150) / 45 = 41$ minutes

STANDARD OPERATING PROCEDURE FOR DECONTAMINATING FIELD EQUIPMENT

Applicability: This SOP was prepared for and applies to activities related to the Statewide Ground Water Quality Monitoring Program and may not be specifically applicable to activities of other organizations.

Purpose: Field equipment must be kept clean to prevent contamination and cross contamination of ground water samples.

Procedures:

Before Going to the Field

1) Disassemble the acrylic filter apparatus. Wash disassembled filter apparatus parts, churn splitter and stainless steel bucket with liquinox soap. Sample container should be stored in a plastic bag, away from all possible sources of contaminants (dust, fumes). Rinse with deionized water, allow to dry, and store all filter apparatus parts in zip-lock bags.

2) Sterilize the fecal coliform filter/holder assembly according to SOP # 5.50.

At the New Site

3) All sampling equipment that comes in contact with sample water (such as tubing, churn splitter, stainless steel bucket, glassware, etc.) should be triple rinsed with native water at each new site. Fill the sample container with native water, replace the lid and remove to the mobile laboratory.

4) Using gloves or non-metal tweezers, place a new 0.45 micron filter between the plastic membranes of the filter apparatus and re-assemble.

5) Run at least 200 ml of native water (no deionized water) through the filter. After this is complete, ground water samples can be collected according to following SOPs.

After Sample Collection

6) After the filtering operation is complete, remove the old filter and run 500 ml. deionized water through the peristaltic pump tubing and filter apparatus.

7) Triple rinse with deionized water, all glassware and field equipment that came in contact with native sample water.

8) If sediment collected on the filter paper, wash equipment with detergent and replace tubing, if necessary.

STANDARD OPERATING PROCEDURE FOR MEASURING ALKALINITY IN THE FIELD

Applicability: This SOP was prepared for applies to activities related to the Statewide Ground Water Quality Monitoring Program and may not be specifically applicable to activities of other organizations.

Purpose: Field alkalinity measurements are more representative than lab measurements. Accuracy requires careful attention to the procedure.

Procedures, using fixed end point method, Hach digital titrator:

1) Assemble the digital titrator by inserting the titrant cartridge into the titrator and inserting the delivery tube into the cartridge. Turn delivery knob to release a few drops of titrant (into a waster container) from the end of the delivery tube, ensuring that no bubbles remain in the delivery tube or the base of the cartridge. Gently blot any drops adhering to the end of the tube, and set digital counter to ZERO reading.

2) The pH meter must be calibrated using two fresh buffers and "checked" with a third. (The majority of Idaho waters are greater than 7.0, so 7 and 10 buffers are usually preferred for the initial calibration). Only electrodes having a slope within 92 to 108 percent and a "check buffer" reading within 0.2 pH units are acceptable.

3) Rinse the electrode thoroughly (at least 3 times) with ample water.

4) Using a graduated cylinder, measure 50 or 100 milliliters of sample water into a clean dry 150 ml beaker and insert pH probe and teflon stirring bar. Be sure to record volume of sample used on the QW field sheet.

5) Place beaker on magnetic stirrer and turn on stirrer. Adjust the rate to low. Turn on pH meter, allowing reading to stabilize, then read and record initial pH value.

6) If pH is less than or equal to 8.3, skip step 7 and go on to step 8.

7) If pH is greater than 8.3, add sulfuric acid immediately from the titrator until a sample of pH of 8.3 is reached. Record the number of digital counts. This data is used for the carbonate calculation. **TIP**: allow reading to stabilize as sulfuric acid is added. If you blow by pH 8.3, start over with step 1.

8) Continue to titrate sample down to a pH of 4.5, being careful to allow the reading to stabilize periodically. If you blow by the pH of 4.5, start over with step 1. This data is used for the bicarbonate calculation. Record the total number of digital counts.

9) Calculations for alkalinity, carbonate and bicarbonate are provided on the QW field sheet.

Mark Hardy has also provided the following equivalent instructions:

Alkalinity Calculations

Calculations	Titrant Normality	Volume of Sample Used			
		25 ml	50 ml	100 ml	150 ml
Alkalinity as CaCO3: Multiply the total digital count to reach pH 4.5 by the appropriate factor in this table.	0.16	0.4	0.2	0.1	0.05
Carbonate in mg/l: Multiply the digital count to reach pH 8.3 by the appropriate factor in this table.	0.16	0.48	0.24	0.12	0.06
Bicarbonate in mg/l: Multiply the quantity, [digital count from initial pH to reach pH 4.5, minus 2 times the digital count to reach pH 8.3] by the appropriate factor in this table.	0.16	0.488	0.244	0.122	0.061

Examples: Both examples use a sample volume of 100 ml and an acid normality of 0.1600.

A) **Native pH = 9.7** Titration results:

volume titrated	pH
0	9.70
225	8.30
654	4.50

Calculations:

Alkalinity (654)(0.1) = 65.4 = 65
Carbonate (225)(0.12) = 27
Bicarbonate [654 - 2(225)](0.122) = (204)(0.122) = 24.89 = 25

B) **Native pH = 7.6** Titration results:

volume titrated	pH
0	7.60
2024	4.50

Calculations:

Alkalinity (2024)(0.1) = 202.4 = 202
Carbonate = 0
Bicarbonate (2024)(0.122) = 246.93 = 247

STANDARD OPERATING PROCEDURE
FOR SAMPLE COLLECTION

Applicability: This SOP was prepared for and applies to activities related to the Statewide Ground Water Quality Monitoring Program and may not be specifically applicable to activities of other organizations.

Purpose: Ground water samples must be collected in a consistent manner, using established procedures, to assure that the resulting analytical data is of the highest quality.

Procedures: The following sections describe collection procedures for unfiltered, filtered, volatile organic compound and radon samples.

General

1) Do not allow bottle rims or inside of caps to touch anything, including fingers, outlet, hydrant or other sampling point parts.

2) Except for radon samples, do not collect ground water samples through a hose. In cases where using a hose is necessary, tygon tubing is acceptable except for VOC or Pesticide samples.

Unfiltered Samples

(raw untreated, radiological, pesticide and bacteriological)

Raw untreated (RU – for lab pH, conductivity and alkalinity), radiological (gross alpha and gross beta), pesticide and bacteriological sample bottles or containers are filled directed from the sampling point (generally a hydrant).

1) RU: Rinse the bottle profusely with native water directly from the sampling hydrant. Fill the bottle, leaving a small amount of air space to facilitate mixing in the lab, then cap. Store RU bottle in zip lock bag.

2) Radiological cubic container: Inflate cubic container by blowing into container. Fill container completely and temporarily cap. In the mobile laboratory, add nitric acid preservative, cap tightly and store unchilled.

3) Bacteriological bottles: **Do not rinse bottle.** Fill bottle, leaving a small amount of air space to facilitate mixing, then cap. Place bottles out of direct sunlight and into ice chest as soon as possible, or run bacteria analysis directly in the field.

4) Immunoassay bottle: Fill bottle and cap. Store in ziplock bag to protect label, place bottle out of direct sunlight and chill immediately.

5) Pesticide bottle: *For specified locations (see summary sheet).* Refer to SOP # 11.0

Filtered

(common ions, nutrients, trace elements)

Common ion (FA, FU), nutrient (FCC) and trace element (FA) sample bottles are filled with filtered sample water.

1) Refer to SOP # 4.00 for equipment decontamination procedures.

2) Remove cap from bottle, filter small amount of native water into bottle, replace cap, shake vigorously to rinse, remove cap and discard water, and replace cap until actual sample collection. Repeat procedure for each bottle.

3) Fill bottles with filtered sample water and temporarily cap each bottle.

4) Put on powderless disposable gloves and protective eye wear.

5) Using a preservation chamber, remove the cap from one sample bottle at a time, add the appropriate preservative, re-cap bottle and shake. Continue until all samples are properly preserved. Make sure caps are tightly sealed. (Mercuric chloride preservative is no longer used for nutrient samples).

6) Put used preservative ampules in a plastic bottle filled with deionized water, cap tightly and secure.

7) Chill nutrient sample. Place remaining bottles in a zip lock bag and store unchilled.

Volatile Organic Compounds (VOCs)

VOC samples must be collected and preserved carefully to prevent volatilization and biodegradation. A large supply of 40 ml sample vials have been shipped to each field office in advance of the field season. Coolers containing VOC sample preparation supplies will arrive on a regular basis. Eight coolers are recycled per field team. Cooler contents:

a) Cutout foam for vial protection. It holds 25 vials.
b) A one bottle trip blank
c) Two vials of organic free water to use in making a transfer blank.
d) A fresh bottle of HCl, enough for 25 vials.
e) Labels, indelible ink marker and lab submittal forms in a ziplock bag.
f) Blue ice bags or similar purpose bags for freezing.

Precautions:

1) **TRIP and TRANSFER BLANKS MUST REMAIN WITH VOC SAMPLES AT ALL TIMES!**

2) Take the sample directly from the source. Do not allow water to stand exposed to the atmosphere. Do not take the sample through a hose. Do not dip vials into a container. Never filter VOC samples.

3) Never sample for volatile organics near any type of exhaust system or fuel tank because discharged fumes or vapors may contaminate the sample. On the field sheet, note any possible environmental contamination, such as odors, fumes, ground spills, etc.

4) Keep all VOC cooler contents together. Ship samples in provided VOC (Alpha Analytical) coolers. Do not use VOC coolers for other purposes.

Procedures:

1) Reduce the flow from the sample point to a very small stream (about a pencil diameter or smaller). Put on disposable gloves and protective eye wear.

2) Carefully fill vial one half to two thirds full by letting the water run down the inside walls of the bottle.

3) Drip 2 drops of 1:1 hydrochloric acid into each VOC vial, allowing the acid to run down the inside wall of the vial. One additional drop may be added if the bottle will be allowed to overflow slightly, but do NOT add more acid than 3 or 4 drops total.

4) Continue to fill vial slowly from the sample point, letting the water run down the inside walls of the bottle until a meniscus forms above the bottle rim. Cap vial tightly.

5) Invert vial and tap **firmly** with finger or heel of hand. Carefully check for bubbles. If any bubbles are present, empty the vial and begin again, starting with step 2. If small bubbles are still present after several tries, cap and submit as sample, making appropriate notes. Refer to 'When Bubbles are Persistent in VOC Samples' below.

6) Repeat steps 2 through 5 for second and third vial.

7) Chill samples to 4º Centigrade, storing with the trip and transfer blanks. Each shipment of VOC samples requires on trip blank and one transfer blank. Transfer blanks are covered in SOP # 9.

8) VOC samples **MUST** be shipped on a timely basis (refer to SOP # 6).

9) At the end of each field day, recheck caps on all vials for tightness. Assuming a rigorous check for bubbles was done at collection, ignore bubbles that form in the vial later.

WHEN BUBBLES ARE PERSISTENT IN VOC SAMPLES:

1) Fill the bottle to a very high meniscus and quickly cap the bottle.

2) In high discharge situations, pierce the flow with a clean, dry glass rod, allowing a small stream of water to run down the rod into the vial. This may be a two person technique.

3) If you still cannot get a VOC sample without bubbles, collect a three bottle sample anyway and note on the lab submittal form that the sample was collected with bubbles. **This note on the lab form is VERY IMPORTANT.** Then collect a second sample via the beaker method (following).

4) Rinse a clean, **dry**, glass beaker several times with native water. Slowly and carefully fill the beaker with sample water. Allow any natural effervescence to settle out, then fill and preserve the VOC sample vials, following the same steps above, using the sample water from the beaker. Note 'BEAKER METHOD' on the lab form, note the new time and change the last two digits of the site ID to 'BM'.

   A dry beaker ensures that no volatiles are present before collecting the sample. If the beaker has any scum or algae on it, wash the beaker with dish soap, then rinse well with native water. According to the Alpha Analytical chief organic chemist, the beaker method is preferable to submitting samples with air bubbles, as the longer period of time of the air bubble exists in the vial allows more volatiles to escape than the brief period of time the sample water is in the beaker. According to 1993 comparison tests on samples from known VOC-contaminated wells, the difference between labs was more significant to the VOC concentration than the beaker method. Having the lab analyze both a sample with bubbles and a beaker method MAY provide some additional comparison data.

IF GLASS ROD OR BEAKER METHODS ARE USED TO COLLECT THE SAMPLE, OR THE SAMPLE CONTAINED BUBBLES AT TIME OF COLLECTION, NOTE THE TECHNIQUE ON BOTH THE LAB SUBMITTAL SHEET AND THE QW FIELD SHEET.

Radon

Radon samples must be collected from non-aerated water, as close to the sampling point as possible.

Precautions:

1) Collect Radon samples last to avoid any contamination from the mineral cocktail.

Procedures:

1) Allow sample water to flow continuously through the hose or portable discharge apparatus into a glass beaker or small plastic container 2 to 3 minutes (or use plastic funnel method). Reduce the discharge from the hydrant and keep the mouth of the hose (or sampling apparatus) below the water surface to prevent aeration.

2) Submerge needle on syringe below water surface and as close to discharging water as possible. Rinse syringe and hypodermic needle 3 times by drawing native water from the container to fill up the syringe and ejecting it away from the container.

3) Slowly withdraw 12 to 15 ml of sample water. Note collection time. Rapid withdrawal of the water sample will create a large negative pressure which may draw radon out of solution.

4) Remove syringe from water. Invert and tap syringe to allow air bubbles to rise to top. Depress plunger slightly to expel air bubbles. Point syringe upward and slowly depress the plunger to expel sample down to 10 ml.

4) Insert needle tip at the bottom of the radon vial, below the surface of the scintillation cocktail. Slowly inject 10 ml of sample water into the vial. Remove needle from vial. Cap vial tightly and shake vigorously. Note date and time on cap (time is recorded in military fashion, eg. 1415 for 2:15 p.m.). DO NOT put tape on the wall of the vial.

5) Immediately complete the radon lab submittal sheet, repack the vial into the cardboard radon mailing tube and roll the lab sheet around the tube, keeping it in place with a rubberband. Place the tube in a federal express mailing envelope. All radon samples collected in one day must be shipped overnight to the Arvada lab.

NOTE: IDWR and the USGS have prepared and distributed a video that reviews the techniques for collecting and preserving VOCs, radon and other more complex techniques of ground water quality sample collection. Please review this video before each field season begins and have all new field personnel review before assisting in sample collection.

STANDARD OPERATING PROCEDURE FOR SHIPPING GROUND WATER QUALITY SAMPLES

Applicability: This SOP was prepared for and applies to activities related to the Statewide Ground Water Quality Monitoring Program and may not be specifically applicable to activities of other organizations.

Purpose: Timely shipping of properly prepared samples is a critical component of usable data.

Procedures: In all cases, check the tightness of caps on all bottles before shipping.

From Field to Alpha Analytical

VOCs: Keep trip and transfer blanks with VOC samples at all times. Keep VOC supplies together. Place VOC vials in provided foam padding. Be sure to include trip and transfer blanks, and the acid bottle. (A new vial of acid will be included with every shipment). Pack the cooler (bottom, sides and top, with enough frozen blue ice packets or ice in ziplock bags to keep samples cool during shipment.

Complete, initial and date lab submittal forms and place in a separate ziplock bag on top of ice packets in cooler. Replace lid of cooler firmly and tape.

VOC samples must be analyzed within 14 days from collection and must be received by the laboratory in a timely manner in order to schedule the large number of incoming samples. Ship samples twice a week via overnight express. Do not ship on Friday, but keep samples cold over the weekend and ship first thing Monday morning. Ship to:

Alpha Analytical, Inc.
255 Glendale Ave, #21
Sparks, NV 89431

From Field to USGS Arvada Lab, Special Handling

Radon: Pack radon vial in cardboard tube provided. Screw on container lid and tape. Roll lab sheet around tube, keeping it in place with a rubberband. Place in Federal Express envelope. Complete Federal Express mailing form and place on envelope. **Federal Express all radon samples so that the laboratory receives them within 24 hours of collection.** Radon samples are shipped to the USGS lab in Arvada, Colorado. Do not collect radon samples on Friday.

Pesticides: Return filled sample bottles to the foam shipping sleeve and place in large ziplock bag to protect label from moisture. Pack in ice chest with sufficient it to maintain chilled conditions. Lab request forms and return labels should be placed in ziplock bags or whirl pack bags and taped to inside of cooler lid. Tape ice chest lid and water drain closed. Ship Federal Express overnight that same day or first thing the next morning to the USGS Lab in Arvada.

Nutrients: Place samples in zip lock bag. Put lab request forms in small ziplock or whirl pack bag and insert in ziplock bag with samples. Pack in ice chest with sufficient ice to maintain chilled conditions. Return mailing labels should be placed in ziplock bags or whirl pack bags and taped to inside of cooler lid. Tape ice chest lid and water drain closed. Tape mailing label to ice chest. Affix “Fragile” and “This Side Up” labels to ice chest. Coolers should contain at least 30% ice. Ship Federal Express overnight that same day or first thing the next morning. Ship Friday samples on Friday.

From Field to USGS Arvada Lab

Unchilled: (Common ions, Trace elements). Place combined in zip lock bags for each respective site. Place lab request form in a whirl pack bag and enclose in the ziplock bag with respective samples. Ship unchilled samples in a disposable cardboard box with appropriate packing to prevent breakage. Every week, ship fourth class or UPS directly to the USGS lab in Arvada, Colorado.

STANDARD OPERATING PROCEDURE FOR BOTTLE LABELING AND LAB FORMS

Applicability: This SOP was prepared for and applies to activities related to the Statewide Ground Water Quality Monitoring Program and may not be specifically applicable to activities of other organizations.

Purpose: To ensure that all data required for electronic transfer is available to laboratories and to program administrators to compile together and relate data analyzed by different labs.

Procedures: To prevent loss of samples due to conditions that render the sample bottle or forms unreadable or due to incorrect identification.

1) Use indelible Sharpie ink on bottles or bottle labels.

2) Enter **both** the USGS 15 digit site ID **and** the local well number, the date, time and laboratory scheduled treatment on each bottle.

3) Put bottles to be chilled in plastic bags before icing to protect the labels.

4) Do not include lab forms with chilled bottles in the plastic bag as condensation may blur the ink on the forms. Put lab forms in separate ziplock bag and tape to inside of ice chest lid or include with unchilled samples.

5) USGS lab request form mandatory items:
   A) Use permanent waterproof ink, including collector's name and telephone number, and local well number.
   B) Site ID number, project account number, date, time, state code, district code and county code.
   C) Schedules, field and laboratory codes - complete all information, schedules and lab codes requested. Be sure to include medium code 6 for ground water.
   D) Field values - field pH, conductivity and alkalinity results.
   E) Bottle types.

6) On lab forms other than USGS lab form, clearly list in ball point pen ink, the site ID, local well (station) number, county, sample date and time, and field team.

7) Collect forms for each lab together in separate batches and put each in a plastic bag.

STANDARD OPERATING PROCEDURE FOR COLLECTING NAWQA PESTICIDE SAMPLES

The instructions were developed by the NAWQA program for collection of pesticide samples for USGS schedules 2001 and 2050. Approximately 210 sites from selected areas will be sampled for pesticides.

Procedures:

1) Samples must be collected directly from the discharge point. DO NOT collect samples from a garden hose, tygon tubing or other plastic hoses. Teflon or stainless steel tubing are acceptable.

2) Use one liter baked amber glass bottle (GCC). Bottle should have old green plastic top or new white metal top. Bottle must have been weighed empty. Use only bottles with white sampling tape with empty weight written on it.

3) Fill one bottle per site (two for NAWQA sites). Label the one bottle **Schedule 2001.** At NAWQA sites, label the second bottle **Schedule 2050**.

4) Also label each bottle "**LC8008" and "Must be Filtered"**. Lab forms should also specify Schedule 2001, Lab Code 8008, and for NAWQA sites Schedule 2050. At NAWQA sites, charge pesticide analyses to 471617500.

5) To sample, put on new vinyl gloves. Remove top of bottle with one hand, holding the bottle with the other. Fill the bottle. DO NOT touch top of bottle, including threaded area with anything, including gloved hands. DO NOT touch bottle to faucet; hold bottle in stream of water only. It is best to hold bottle from the bottom so it doesn't slip out of your hands when it gets heavy. DO NOT touch the inside of the cap with anything. Try not to put the cap on the ground, but if you need to, choose a location where there is absolutely no chance of contamination. If you drop the cap on the ground, discard the bottle and use a new one. Please be very careful to avoid any chance of contamination because the new detection limits are now down to parts per trillion.

6) Leave a small amount of head space in the bottle and cap.

7) Place the bottle in a foam sleeve and place on ice immediately. Samples must be on ice at all times.

8) Ship samples Federal Express overnight to the National USGS Lab in Denver. Samples must be extracted within **four days** of sample collection.

BACTERIA MEDIA KIT PREPARATION

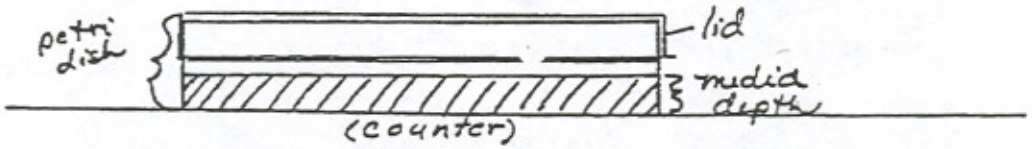
General Directions: Fecal Strep, Fecal Coliform, Total Coliform

1. Dissolve media-agar in 100 mls. of the required liquid in a 250 ml beaker of flask. Make sure all lumps are completely broken. (F.C. media only: Allow rosolic acid-NaOH solution to dissolve 15 minutes and add 1 ml of that solution to the the media-agar solution.

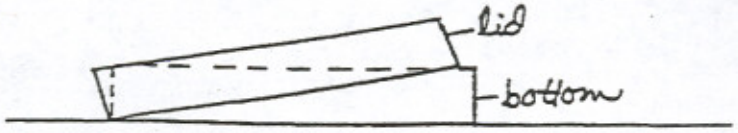
2. Heat to just boiling (99-100C). Stir well. Cool to lukewarm on wrist. (F.S. media only: Add 1 ml Sterile TTC and mix completely).

3. Pour in to sterile petri dishes, let cool, invert dishes, refrigerate. Kits make approximately 15 dishes per batch.

NOTE: petri dishes with media should be stored inverted in refrigerator so water condensation will not drip onto media surface, running bacteria colonies together.



4. PETRI DISH CONTAMINATION:
Since the coliform bacteria to be counted in these tests are also very common in the air, sterile petri dishes should be open to the air for the shortest possible time. The easiest way not to contaminate the dishes while still pouring media quickly is to pry off the lids and leave them on top at a slight angle (do this before starting media).



When you get ready to pour the media, just lift each lid away slightly as you pour, then replace on top as soon as possible.

5. Specific details for media prep. and colony counting are found in MIllipore's Biological Analysis of Water and Wastewater, Application Manual AM302; pps. 19-21, 33-36.

6. Media ingredients, incubation & storage information, colony characteristics are listed on the back of this sheet.

EPA

HEALTH ADVISORY SUMMARY

Dacthal (DCPA)

What is a Health Advisory?

Health Advisories are guidance documents issued by the U.S. Environmental Protection Agency to assist federal, state, and local officials in responding to drinking water contamination. The Health Advisories contain information on health risks and treatment technologies, and specify levels of chemical concentrations in water that are acceptable for drinking. In preparing Health Advisories, EPA reviews available human data and experimental animal studies in evaluating potential human health effects. The Health Advisories are updated as new information becomes available. This summary presents key highlights from the Health Advisory for Dacthal.

What is Dacthal?

Dacthal, also known as DCPA, is a herbicide used to control annual grasses in turf, ornamentals, strawberries, seeded vegetables, cotton, soybeans, and field beans.

What Health Effects Might Be Caused by Dacthal in My Water?

Non-Cancer Effects. EPA has set a Lifetime Health Advisory level for Dacthal and its metabolites in drinking water at ***4000 micrograms per liter****. This level includes a margin of safety to protect human health and should be regarded as a guideline. EPA believes that water containing Dacthal at or below this level is acceptable for drinking every day over the course of one's lifetime, and does not pose any health concerns.

However, consuming Dacthal at high levels well above the Lifetime Health Advisory level over a long period of time has been shown to result in damage to the liver, kidney, and thyroid, in animal studies.

Cancer Risk. Data from laboratory studies are inadequate for EPA to determine if Dacthal can increase the risk of cancer in humans.

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* Micrograms per liter are the units of measurement for contaminants in water, equivalent to parts per billion.

What Actions Should I Take?

Your first step should be to get the advice of your state or county health officials. Other experts in your state environmental agency or agriculture department may also be helpful to you.

These people are likely to recommend that you retest your well to get an accurate overall picture of the water quality. Seasonal precipitation changes and changes in pesticide use can cause wide variations in the amount of pesticides found in your well.

Upon retesting, if Dacthal or its metabolites is detected in your drinking well at or below 4000 micrograms per liter, you should continue to retest your well periodically. Your state or county health officials can refer you to approved testing services, advise you on the cost of testing, and recommend how often you should retest.

If Dacthal or its metabolites is detected in your water and confirmed by retesting at a level above 4000 micrograms per liter, once again consult your state or county health officials. They may advise you to continue periodic retesting, or in some cases, to use an alternative drinking water supply (such as bottled water) or treat the water or dig a new or deeper well.

At present, reverse osmosis appears to be a possible method for removing Dacthal from water. However, this technique is not necessarily appropriate or available in every situation. Your state or county health officials should be able to advise you on the best approach to follow.

Where Can I Get More Information?

In addition to your state and county experts, EPA has two toll-free lines you can call. For further information on drinking water quality, treatment technologies, and EPA's Health Advisories, please contact EPA's toll-free Safe Drinking Water Hotline, Monday thru Friday, 8:30 A.M. to 4:30 P.M. E.S.T. at 1-800-426-4791.

Additional information on the health effects of pesticides is available from the National Pesticide Telecommunications Network, toll-free, 24 hours a day, 1-800-858-7378.

DRAFT

DRINKING WATER MONITORING REQUIREMENTS

FOR NEWLY DEVELOPED DRINKING WATER SOURCES

All the following testing must be completed and demonstrate that water falls within allowable contamination levels (below MDL) before a newly developed source can deliver drinking water to the public. The only exceptions to monitoring requirements are denoted by a parenthetical statement or footnote symbol beside the name of the contaminant.

Required Monitoring or Determination	Regulatory Status	Action After Review of Results
Coliform	Coliform Rule	Contamination will require disinfection treatment.
Surface Water Influence Determination (Required only for all wells located less than 200 feet horizontally from surface water and wells screened or perforated less than 50 feet deep and all springs and infiltration galleries)	Surface Water Treatment Rule	Determination that water is surface water influenced will require disinfection, turbidity monitoring and probably filtration.
Treatment Contact Time (Only if disinfection is required)	Coliform Rule or Surface Water Treatment Rule	If disinfection is required, an IDEQ engineer will work with water system to ensure contact time is sufficient to deactivate the required percentage of organisms.

MONITORING REQUIRED FOR NEW WATER SOURCE DEVELOPMENT

VOC Contaminant	Regulatory Status	MCL mg/l	MDL mg/l
Vinyl chloride	Phase II	.002	.0005
Benzene	Phase II	.005	.0005
Carbon tetrachloride	Phase II	.005	.0005
1,2-dichloroethane	Phase II	.005	.0005
Trichloroethylene	Phase II	.005	.0005
para-dichlorobenzene (1,4-dichlorobenzene)	Phase II	.075	.0005
1,1-dichloroethylene	Phase II	.007	.0005
1,1,1-trichloroethane	Phase II	0.2	.0005
cis-1,2-dichloroethylene	Phase II	.07	.0005
1,2-dichloropropane	Phase II	.005	.0005
Ethylbenzene	Phase II	0.7	.0005
Monochlorobenzene	Phase II	0.1	.0005
ortho-dichlorobenzene (1,2-dichlorobenzene)	Phase II	0.6	.0005
Styrene	Phase II	0.1	.0005
Tetrachloroethylene	Phase II	.005	.0005
Toluene	Phase II	1	.0005
trans-1,2-dichloroethylene	Phase II	0.1	.0005
Xylenes (total)	Phase II	10	.0005
Dichloromethane	Phase V	.005	.0005
1,2,4-trichlorobenzene	Phase V	.07	.0005
1,1,2-trichloroethane	Phase V	.005	.0005
Chloroform	THM rule: (Only systems serving a population of 10,000 or more people are required to conduct this test)	.10 mg/l is the MCL for the sum of the concentrations of all 4 THMs.	
Bromodichloromethane			
Chlorodibromomethane			
Bromoform			
meta-dichlorobenzene (1,3-dichlorobenzene)	Unregulated	Unregulated	
1,1-dichloropropene	Unregulated	Unregulated	
1,1-dichloroethane	Unregulated	Unregulated	
1,1,2,2-tetrachloroethane	Unregulated	Unregulated	
1,3-dichloropropane	Unregulated	Unregulated	
Chloromethane	Unregulated	Unregulated	
Bromomethane	Unregulated	Unregulated	
1,2,3-trichloropropane	Unregulated	Unregulated	
1,1,1,2-tetrachloroethane	Unregulated	Unregulated	
Chloroethane	Unregulated	Unregulated	
2,2-dichloropropane	Unregulated	Unregulated	
ortho-chlorotoluene (1,2-chlorotoluene)	Unregulated	Unregulated	
para-chlorotoluene (1,4-chlorotoluene)	Unregulated	Unregulated	
Bromobenzene	Unregulated	Unregulated	
1,3-dichloropropene	Unregulated	Unregulated	

SOC Contaminant	Regulatory Status	MCL mg/l	MDL mg/l
Alachlor	Phase II	.002	.0002
Aldicarb	Phase II	Delayed	.0005
Aldicarb sulfoxide	Phase II	Delayed	.0005
Aldicarb sulfone	Phase II	Delayed	.0008
Atrazine	Phase II	.003	.0001
Carbofuran	Phase II	.04	.0009
Chlordane	Phase II	.002	.0002
Dibromochloropropane (DBCP)	Phase II	.0002	.00002
2,4-D (2,4-dichlorophenoxyacetic acid)	Phase II	.07	.0001
Ethylene dibromide (EDB)	Phase II	.00005	.00001
Heptachlor	Phase II	.0004	.00004
Heptachlor epoxide	Phase II	.0002	.00002
Lindane	Phase II	.0002	.00002
Methoxychlor	Phase II	.04	.0001
Polychlorinated biphenyls (PCBs)	Phase II	.0005	.0001
Pentachlorophenol (penta)	Phase II	.001	.00004
Toxaphene	Phase II	.003	.001
2,4,5-TP (2,4,5-trichlorophenoxypropanic acid) or (Silvex)	Phase II	.05	.0002
Benzo[a]pyrene	Phase V	.0002	.00002
Dalapon	Phase V	0.2	.001
Di(2-ethylhexyl)adipate	Phase V	0.4	.0006
Di(2-ethylhexyl)phthalate	Phase V	.006	.0006
Dinoseb	Phase V	.007	.0002
Diquat †	Phase V	.02	.0004
Endothall †	Phase V	0.1	.009
Endrin (Also regulated under phase I with a MCL of .0002 mg/l)	Phase I/V	.002	.00001
Glyphosate †	Phase V	0.7	.006
Hexachlorobenzene	Phase V	.001	.0001
Hexachlorocyclopentadiene	Phase V	.05	.0001
Oxamyl (Vydate)	Phase V	0.2	.002
Picloram	Phase V	0.5	.0001
Simazine	Phase V	.004	.00007
2,3,7,8-TCDD★ (2,3,7,8-tetrachlorodibenzodioxin) or (Dioxin)★	Phase V	$3x10^{-8}$	$5x10^{-9}$
Aldrin	Unregulated	Unregulated	
Butachlor	Unregulated	Unregulated	
Carbaryl	Unregulated	Unregulated	
Dicamba	Unregulated	Unregulated	
Dieldrin	Unregulated	Unregulated	
3-hydroxycarbofuran	Unregulated	Unregulated	
Methomyl	Unregulated	Unregulated	
Metolachlor	Unregulated	Unregulated	
Metribuzin	Unregulated	Unregulated	
Propachlor	Unregulated	Unregulated	

★ New source testing for dioxin and asbestos will not be required except in special circumstances. You will be notified if your system is required to test for dioxin and/or asbestos.

† IDEQ may not require monitoring for diquat, endothall, or glyphosate for systems serving 150 connections or less.

IOC Contaminant	Regulatory Status	MCL mg/l
Fluoride	Phase II	4.0
Asbestos★	Phase II	7 million fibers per liter (> 10μm long)
Barium	Phase II	2
Cadmium	Phase II	0.005
Chromium	Phase II	0.1
Mercury	Phase II	0.002
Nitrate	Phase II	10 (as nitrogen)
Nitrite	Phase II	1 (as nitrogen)
Total nitrate and nitrite	Phase II	10 (as nitrogen)
Selenium	Phase II	0.05
Antimony	Phase V	0.006
Arsenic	Phase I (Regulation currently being modified to reduce MCL)	0.05
Beryllium	Phase V	0.004
Cyanide (as free cyanide)	Phase V	0.2
Nickel	Phase V	0.1
Thallium	Phase V	0.002
Lead	Lead/Copper Rule	0.015 (90%ile action level)
Copper	Lead/Copper Rule	1.3 (90%ile action level)
Sulfate	Phase V (delayed)	
Sodium	Unregulated	Unregulated
Alpha Radioactivity	Phase I	15 pCi/L
Beta Radioactivity (Required only of systems over 100,000 population)	Phase I	4 mREM/yr
Sand content (for wells only)	IDAPA 16.01.08550,02.d.iii	5 ppm requires screening/gravel packing
Temperature (properly taken on site)	Corrosivity/lead ban	Non corrosive to lead and copper
pH (properly taken on site)	Corrosivity/lead ban	Non corrosive to lead and copper
Total Dissolved Solids (TDS)	Corrosivity/lead ban	Non corrosive to lead and copper
Alkalinity	Corrosivity/lead ban	Non corrosive to lead and copper
Calcium Hardness	Corrosivity/lead ban	Non corrosive to lead and copper
Turbidity (only if surface water or determination surface water influence is made)	Surface Water Treatment Rule	Performance Standard

Monitoring Recommended but not Required	Regulatory Status	MCL
Aluminum	Secondary	.05 to .02 mg/l
Chloride	Secondary	250 mg/l
Color	Secondary	15 Color units
Copper	Secondary	1.0 mg/l
Fluoride	Secondary	2.0 mg/l
Foaming agents	Secondary	0.5 mg/l
Iron	Secondary	0.3 mg/l
Manganese	Secondary	0.05 mg/l
Odor	Secondary	3 Threshold odor number
Silver	Secondary	0.1 mg/l
Zinc	Secondary	5 mg/l

★ New source testing for dioxin and asbestos will not be required except in special circumstances. You will be notified if your system is required to test for dioxin and/or asbestos.